

The Nucleus of Comet Hyakutake (C/1996 B2)

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We present results from our intensive multiwavelength campaign to observe the nucleus of comet Hyakutake (C/1996 B2) as it passed 0.1 AU from Earth in late March, 1996. In an attempt to take advantage of this fortuitous close-approach, we imaged the comet in the optical (at KPNO 0.9-m, 19 - 23 March), near- and thermal-infrared (at NASA/IRTF, 19 - 22 and 24 - 25 March), and microwave (at VLA, 27 March). Our goals are to characterize as many physical properties of the nucleus as possible, e.g., radius, albedo, temperature, and rotation rate. Well-constrained physical information on the population of nuclei is scarce, and especially so for the long-period objects.

Our optical data – images in the IHW narrow-band filters – have yielded a rotation rate of 0.236 days, but no explicit nuclear signature. Our single VLA track (at a wavelength of 3.55 cm) allowed us to obtain flux density upper-limits that are smaller than any other VLA continuum observation of a comet, and an upper-limit to the radius of about 3 km. By modeling the intensity distribution of the coma, we have extracted the nuclear flux from our thermal-infrared (5 - 21 μm) images, and obtained an effective nuclear radius of 2.4 ± 0.5 km. In addition, we present preliminary results from our attempts to simulate the infrared emission from the nucleus using a model that accounts for nuclear ellipticity, rotation, surface heterogeneity, and material properties.

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